

## CLAIMS

1. A method of incrementally updating a checksum in a network data packet header,  
the method comprising the steps of:

calculating a partial one's complement sum;

5 modifying at least one field of the network data packet header; and

adding a value to the partial one's complement sum to create an incrementally  
updated checksum.

2. The method of claim 1 wherein the step of calculating the partial one's  
complement sum includes subtracting an IP source address, an IP destination address, and a  
10 plurality of protocol bits from the checksum.

3. The method of claim 2 wherein the step of calculating the partial one's  
complement sum further comprises subtracting a source port and a destination port.

4. The method of claim 3 wherein the step of calculating the partial one's  
complement sum further comprises subtracting a sequence number and an acknowledgement  
15 number.

5. The method of claim 1 wherein the network data packet contains an IPv6 header  
having at least a source address, a destination address, and a next header field.

6. The method of claim 5 wherein the step of calculating the partial one's  
complement sum includes subtracting the source address, the destination address, and the next  
20 header field from the checksum.

7. A method of incrementally updating a checksum in a network data packet header,  
the method comprising the steps of:

receiving, at a packet processor, a data packet having a plurality of header fields  
comprising a source address, a destination address, and a plurality of  
5 protocol bits;

calculating a partial one's complement sum by subtracting from the checksum at  
least one of the header fields;

modifying at least one of the header fields to create a modified header;

adding to the partial one's complement sum a checksum value of the at least one  
10 modified header fields to obtain an updated checksum; and

transmitting the data packet having the modified header and updated checksum  
from the packet processor.

8. The method of claim 7 wherein the header fields further comprise a source port  
and a destination port.

15 9. The method of claim 8 wherein the header fields further comprise a sequence  
number and an acknowledgement number.

10. The method of claim 7 wherein the header fields are IPv6 header fields and  
comprise a source address, a destination address, and a next header field.

11. A method of incrementally updating a checksum in a network data packet header,  
20 the method comprising the steps of:

receiving, at a network switch, a data packet having a plurality of header fields  
comprising a source address, a destination address, a plurality of protocol  
bits, a source port, and a destination port;

calculating a partial one's complement sum by subtracting from the checksum the  
header fields;  
modifying at least one of the header fields to create a modified header;  
adding to the partial one's complement sum a checksum value of the modified  
5 header to obtain an updated checksum; and  
transmitting the data packet having the modified header and updated checksum  
from the network switch.

12. The method of claim 11 wherein the header fields further comprise a sequence  
number and an acknowledgement number.

10 13. The method of claim 10 wherein the header fields are IPv6 header fields and  
comprise a source address, a destination address, and a next header field.

14. A system for incrementally updating a network data packet checksum, the system  
comprising:

15 an input parser configured to identify one or more header fields of an incoming  
data packet and to compute a partial one's complement sum from a  
reduced header part;

a buffer memory for buffering the incoming data packet; and

20 a circuit connected to the buffer memory for computing an updated data packet  
checksum from a modified reduced header part and the partial one's  
complement sum.

15. The system of claim 14 wherein the reduced header part comprises a source  
address, a destination address, and a plurality of protocol bits.

16. The system of claim 15 wherein the reduced header part further comprises a source port and a destination port.

17. The system of claim 16 wherein the reduced header part further comprises a sequence number and an acknowledgement number.

5 18. The system of claim 14 wherein the reduced header part comprises a source address, a destination address, and a next header field.

19. A system for incrementally updating a network data packet checksum, the system comprising:

means for identifying one or more header fields of the incoming data packet;

10 means for buffering the incoming data packet;

means for computing a partial one's complement sum from a reduced header part;

and

means for transmitting the data packet to its next hop.

15 20. The system of claim 19 wherein the reduced header part comprises a source address, a destination address, and a plurality of protocol bits.

21. The system of claim 20 wherein the reduced header part further comprises a source port and a destination port.

22. The system of claim 21 wherein the reduced header part further comprises a sequence number and an acknowledgement number.

20 23. The system of claim 19 wherein the reduced header part comprises a source address, a destination address, and a next header field.